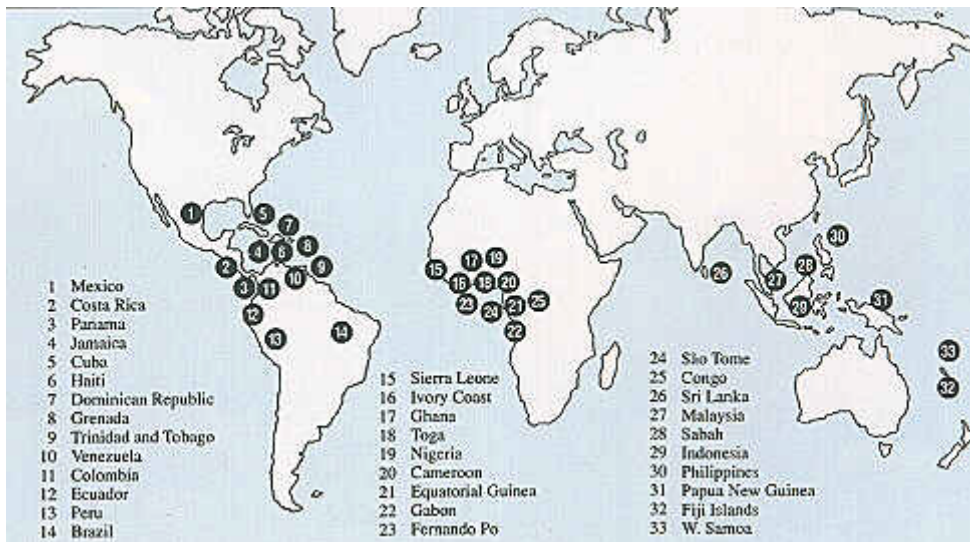




Chocolate is Cadbury is Chocolate is

COCOA AND CHOCOLATE

Cocoa Growing Countries



Main Cocoa Growing Countries

Cocoa powder and chocolate are made from the dried seeds that are found in pods on the cacao tree. In the 18th century the Swedish botanist, Carolus Linnaeus, renamed the cocoa tree giving it the Greek name *Theobroma Cacao*, now its official botanical name, which literally means 'food of the Gods.'

Although a native of the Amazon basin and other tropical areas of South and

Central America, where wild varieties still grow in the forests, the cocoa growing area has extended to the Caribbean and beyond. Different types of cocoa are selected for cultivation in the various growing areas.

Most of the world's cocoa is grown in a narrow belt 10 degrees either side of the Equator because the trees grow well in humid tropical climates with regular rains and a short dry season. Even temperatures between 21 and 23 degrees centigrade, with a fairly constant rainfall of 1,000 to 2,500 mm per year, are needed without hot dry winds and drought.

Many countries now grow cocoa but the main producers are -

- West Africa - Ghana which grows some of the best quality cocoa in the world, Nigeria and Cote D'Ivoire
- South America - Brazil and Ecuador
- Asia - Malaysia and Indonesia, where cocoa is a relatively new crop, are becoming increasingly important growing areas.

Cocoa was first planted in Ghana, now a major producer, in 1879 and as in the rest of West Africa, cocoa is grown almost entirely on smallholdings where the whole family works together. Cocoa farming is a small, unsophisticated business as the current planting patterns of cocoa trees make mechanisation impractical.

In Asia, public and private plantations have been developed as well as the small farms.



Drawing of Cocoa Pods.



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COCOA AND CHOCOLATE

Types of Cocoa

There are three broad types of cocoa *FORASTERO* and *CRILLO* plus *TRINITARIO* which is a hybrid of Forastero and Crillo. Within these types are several varieties.

FORASTERO, which now forms the greater part of all cocoa grown, is hardy and vigorous producing beans with the strongest flavour. *AMELONADO* is the Forastero variety most widely grown in West Africa and Brazil. It has a smooth yellow pod with 30 or more pale to deep purple beans.

CRILLO with its mild or weak chocolate flavour is grown in Indonesia, Central and South America. Crillo trees are not as hardy and they produce softer pods which are red in colour, containing 20-30 white, ivory or very pale purple beans.

TRINITARIO plants are not found in the wild as they are cultivated hybrids of the other two types. Trinitario cocoa trees are grown mainly in the Caribbean area but also in Cameroon and Papua New Guinea. The mostly hard pods are variable in colour and they contain 30 or more beans of variable colour but white beans are rare.

Cocoa trees resemble English apple trees, seldom reaching more than 7.5 metres (25 feet) high and they are carefully pruned so that pods can be more easily harvested

To flourish they need to be shaded from direct sun and wind particularly in the early stages of growth. Two methods are used to establish cocoa trees:

- Young trees are interspersed with new permanent or temporary shade trees such as coconut, plantains and bananas, following the clear-felling of the forest. In Asia where large plantations have been developed, cocoa trees and coconut trees are planted together and both crops are harvested commercially.
- Alternatively forest trees are thinned out and the cocoa trees are planted between established trees.

Cocoa trees begin to bear fruit when they are 3-4 years old. The pink and white flowers, then the pods grow straight out of the trunk and main branches which is most unusual. Like most tropical plants, flowers are present throughout the year but appear in abundance before the rain starts. Only a small proportion of all the flowers develop into fruit over a period of about five months.



Cocoa Trees



Picking Cocoa pods



Cocoa Pods

Each tree will yield 20-30 pods per year and the peak time for harvesting is between September and December in West Africa.

The pods are hard and melon shaped, between 15-20cm long and each weighing about 450g each. When the pods are ripe they change from green to yellow, red or orange. Each pod contains 20-40 seeds which when dried are the cocoa beans of commerce.

It takes the whole year's crop from one tree to make 450gms of chocolate.



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COCOA AND CHOCOLATE

Harvesting Ripe Pods And Curing The Cocoa Beans



Splitting open a Cocoa Pod

The harvesting of the pods is very labour intensive and on the West African small-holdings the whole family, together with friends and neighbours help out. Ripe pods are gathered every few weeks during the peak season.

Workers cut the high pods from the trees with large knives attached to poles, taking care not to damage nearby flowers or buds.

The women of the family collect the pods in large baskets which they carry on their heads to be piled up ready for splitting.

The pods are split open by hand and the seeds or beans, which are covered with a sweet white pulp or mucilage, are removed ready to undergo the two part curing process - fermentation followed by drying. This prepares the beans for market and is the first stage in the development of the delicious chocolate flavour.

Methods of fermentation vary considerably from country to country but basically there are two methods - **HEAP** and **BOX**.

Traditionally the **HEAP** method is used on the farms in **West Africa**. Wet cocoa beans, surrounded by the pulp, are piled on banana or plantain leaves which are spread out in a circle on the ground. More leaves are put on top to cover the heap and it is left for 5-6 days, turning to ensure even fermentation. Cocoa is also fermented in baskets lined and covered with leaves - a method used in Nigeria.



A pile of Cocoa Pods



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COCOA AND CHOCOLATE

Harvesting Ripe Pods And Curing The Cocoa Beans cont.

During fermentation the pulp and astringency of the beans are removed as the sugar in the pulp turns to alcohol and vinegar-like liquids, which drain away and the true chocolate flavour starts to develop.

When fermentation is complete the wet mass of beans is dried, traditionally by being spread in the sun on mats.



Fermenting beans

In the West Indies, Latin America and in Malaysia the BOX method is used in the plantations while on small farms the traditional heap method is still used. Box fermentation involves the use of strong wooden boxes with drainage holes or gaps in the slats in the base to allow the passage of air and the removal of liquid products of fermentation. The process takes 6-8 days during which time the beans are mixed twice.

The fermented beans are then dried by means of special drying equipment rather than out in the sun.

The cured beans are packed into sacks for transportation to Singapore where Cadbury process the cocoa beans. Stringent quality control procedures are carried out as samples are checked to ensure that standards are maintained before cocoa beans are bought from the farmer and again during transportation.



Beans spread out to dry



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COCOA AND CHOCOLATE

Processing the Cocoa Beans



Sorting Cocoa Beans

Cadbury's cocoa factory at Singapore operates 24 hours a day, seven days a week, producing the basic ingredients from which all Cadbury chocolate products are made. 18,000 tonnes of cocoa beans are processed each year using the latest technological control systems to ensure that the end product is of the highest quality. On arrival at the factory, the cocoa beans are sorted and cleaned. They are then treated through a microniser to break the shell and a winnower to remove the shell. The beans are broken down into small pieces called nibs and are subsequently roasted at a temperature of 135°C. The actual roasting time depends on whether the end use is for cocoa or chocolate.

During roasting, the cocoa nibs darken in colour and acquire their characteristic chocolate flavour. This flavour however, had actually started to develop during fermentation back on the farm.

Cocoa nibs are ground in stone mills until the friction and heat of the milling reduces them to a thick chocolate coloured liquid, known as 'mass', which contains 53-58% cocoa butter and solidifies on cooling. This is the basis of all chocolate and cocoa products.

Cocoa powder is made by extracting about half the cocoa butter in heavy presses. The amount of cocoa butter removed is specified in the ANZFA food laws. The solid blocks of compressed cocoa remaining after extraction is pulverised into a fine powder to produce a high-grade cocoa powder for use as a beverage or in cooking.

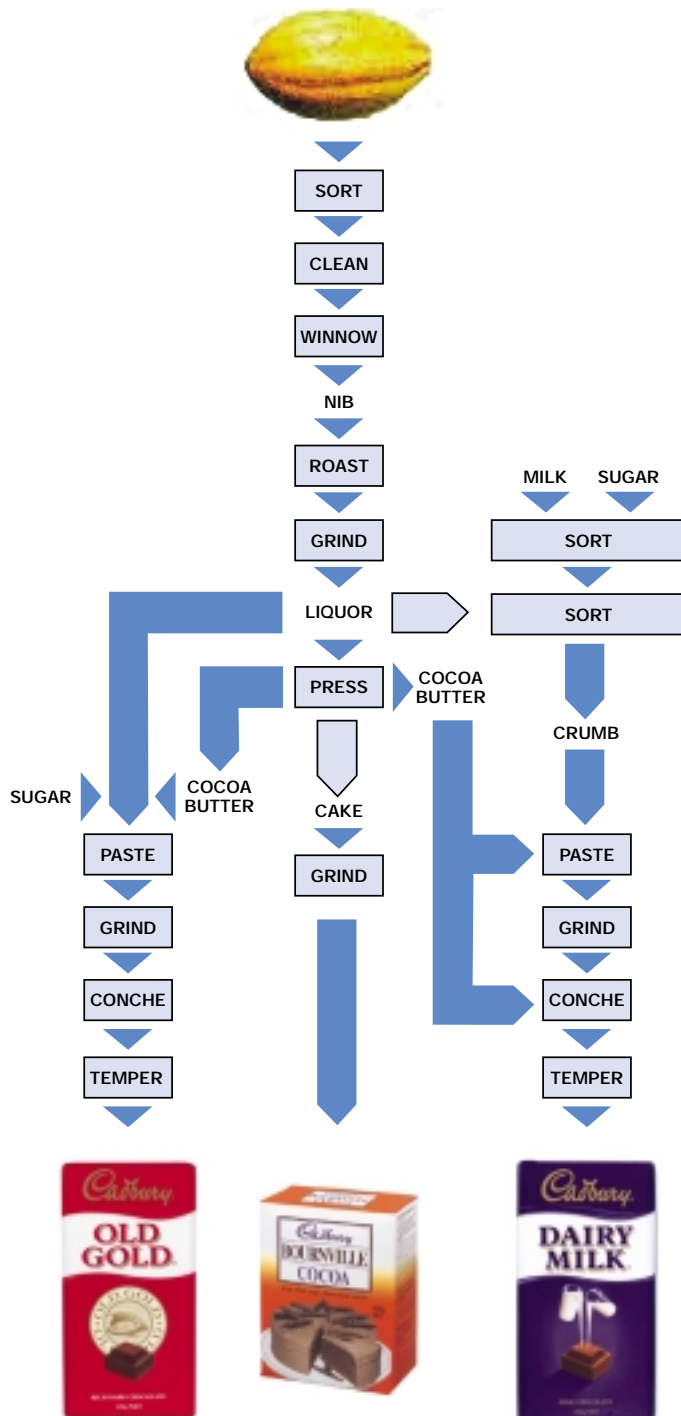
The extracted cocoa butter is used in the recipes for the wide range of Cadbury's chocolate, the most famous brand being Cadbury's Dairy Milk, Australia's favourite moulded chocolate bar.



Chocolate is Cadbury is Chocolate is

COCOA AND CHOCOLATE

Chocolate Making



Cadbury make a variety of chocolates for different purposes but the two main types are - Cadbury's Dairy Milk milk chocolate and Cadbury's Old Gold dark chocolate.

The special taste and texture of Cadbury's chocolate are based on long traditions of expertise in recipe and processing which are unique to Cadbury. Techniques are improving all the time and new technology enables the whole process to be finely tuned to the consumer's evolving tastes and preferences.

Production starts at the Singapore cocoa factory where the top quality cocoa beans are processed to produce the cocoa mass containing 53 % cocoa butter plus extracted cocoa butter, the basis for all chocolate products.

When dark chocolate is made, the 'mass' goes straight to the Cadbury factory in Ringwood, Victoria or Claremont, Tasmania.

At the milk processing factory in Burnie, fresh liquid full cream milk is collected and condensed for transport by road tanker to Claremont. Sugar is added to the condensed milk with some of the cocoa mass, making a rich creamy chocolate liquid which is then evaporated to make milk chocolate crumb. As these ingredients are cooked together the very special rich creamy taste of Cadbury's chocolate is produced. 22,000 tonnes of crumb a year are produced at Claremont to be made into chocolate at the Cadbury chocolate factories at Claremont and Ringwood.

On arrival at the chocolate factory the crumb is passed through a pin mill and mixed with additional cocoa liquor and cocoa butter as well as special chocolate flavourings. The amount of emulsifiers added depends on the consistency of the chocolate required; thick chocolate is needed for moulded blocks, while a thinner consistency is used for assortments and covered bars.

Both milk and dark chocolate, undergo the same final special production stages, such as refining and conching which produce the famous smoothness, gloss and snap of Cadbury's chocolate.



Chocolate is Cadbury is Chocolate is

COCOA AND CHOCOLATE

Chocolate Making cont.



The most important component of chocolate, as far as texture is concerned, is the fat and the special processes known as conching and tempering which are very carefully controlled to produce chocolate with the fat in a specific physical structure.

The fat must coat individual particles of cocoa, milk and sugar, combining them together to form the solid chocolate.

Conching involves mixing and beating the semi-liquid mixture to develop the flavour, removing unwanted volatile flavours and reducing the viscosity and particle size.

Tempering is the final crucial stage. It is a complex process which in simple terms involves mixing and cooling the liquid chocolate under carefully controlled conditions to ensure that the fat in the chocolate crystallises in its most stable form. Highly sophisticated machinery has been developed for this process and the control of it is one of the skills of the chocolatier.

Without the right tempering, the chocolate would be very soft and gritty as large crystals would form and the lovely gloss and snap of top quality chocolate would soon disappear.

Tempered chocolate is used in a number of ways to produce Cadbury's famous brands.





Chocolate is Cadbury is Chocolate is

COCOA AND CHOCOLATE

Chocolate Making cont.

Cadbury's chocolate production is a highly sophisticated, computer controlled process, with much of the new specialist machinery being produced to Cadbury's own design and specification.

The Claremont factory alone produces 26,000 tonnes of moulded chocolate blocks and assortments each year whilst the Ringwood facility produces 26,000 tonnes of chocolate bars, novelty and seasonal products each year.

Blocks of solid chocolate, with or without added ingredients such as nuts and raisins are known in the industry as 'moulded' products. Tempered chocolate is poured into bar shaped moulds, shaken and cooled then the unmoulded blocks continue to high speed wrapping plants. One of the most recently commissioned plants has the potential for producing 700 blocks per minute.

Cadbury's Dairy Milk, Australia's favourite moulded chocolate block is available in a wide range of block sizes to suit all ages and all eating occasions. Dairy Milk is also the main ingredient of other Cadbury favourites such as Hazelnut and Fruit and Nut.



Moulded blocks come in different sizes -

- Large blocks - 250g and 400g, with even larger blocks for special occasions, bought for sharing or as a gift.
- Smaller blocks – 150g, 100g and chunky bars to share or enjoy as a 'big eat'
- Snack size - for the lunch box
- Treat size - small individual bars to enjoy as a small treat

In bar products such as Crunchie, Cherry Ripe, or TimeOut, the chocolate covers the centre filling. This is achieved by the 'enrobing' process where the centres pass on a continuous belt beneath a curtain of liquid chocolate.

Assortments such as the boxed selection Cadbury's Milk Tray or the twist wrapped Cadbury's Roses are made either by the same 'enrobing' method or 'shelling'. Here the liquid chocolate is deposited into a mould to form a shell into which the centre is deposited and then this is sealed with the 'back'.

Another process used is 'panning' where pieces of biscuit, raisins or caramel are coated with chocolate in a revolving drum.

Shell Easter eggs are made by the 'shell moulding' process while Cadbury has a special unique process for products like Yowie and Cadbury's famous Creme Eggs.



Chocolate is Cadbury is Chocolate is

COCOA AND CHOCOLATE

Chocolate Making cont.



Australian food laws are quite specific about what can and cannot be called 'chocolate'. It is any product that is obtained from cocoa nibs, cocoa mass, cocoa, fat-reduced cocoa or any combination of two or more of these ingredients, with or without extracted cocoa butter and sucrose.

Chocolate must contain not less than 15% total dry cocoa solids, excluding cocoa butter. It is the cocoa solids that give the chocolate its rich flavour and the amounts included in the recipe vary with different brands, giving them their own characteristic taste.

Milk chocolate must contain a minimum of 14% milk solids or 27% as in Cadbury's Dairy Milk.

There is another range of products popularly referred to as 'compounded chocolates' many of which in fact should be called 'chocolate flavoured cake coverings' because they do not contain cocoa butter. Vegetable fats are used which not only alters their texture but also their melting properties.

Chocolate is a recipe product and different traditions and tastes have developed in different countries of the world.

Dark chocolate is the most popular in Europe and their chocolate has a higher level of cocoa solids giving it a much stronger flavour. Milk chocolate is the preferred choice in Australia while the Americans favour dark chocolate with the smoky flavours of South American beans.

Another important difference between the recipe traditions of European and UK chocolates is the kind of milk used. European manufacturers use dried milk powder, often mixed with whey powder. However, UK style manufacturers and Cadbury Australia use fresh milk. Indeed, Cadbury Australia believes that the very best milk chocolate is made with fresh milk.

It is the special flavours produced when fresh milk, cocoa mass and sugar are cooked together in the first stages of the chocolate crumb making process that give Cadbury's Dairy Milk its very special taste.